Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1 -29 (Canceled)

30. (Currently amended) A system according to claim ~~27~~ 51, wherein the pyrolysis/reaction chamber is a double-walled chamber, comprising a space between said walls through which water is caused to circulate, thereby cooling said pyrolysis/reaction chamber.

31. (Previously Presented) A system according to claim 30, wherein the walls of the chamber are made of stainless steel.

32. (Currently amended) A system according to claim ~~27~~ 51, wherein the pyrolysis/reaction chamber has a metal wall, which is lined on the inside with refractory material.

33. (Canceled)

34. (Canceled)

35. (Canceled

36. (Currently amended) A system according to claim ~~27~~ 51, wherein the post-pyrolysis subsystem comprises a particle trap to remove any solid particles from the mixture of product gases.

37. (Currently amended) A system according to claim ~~27~~ 51, wherein the post-pyrolysis subsystem comprises a radiation cooler to rapidly reduce the temperature of the mixture of product gases.

38. (Currently amended) A system according to claim ~~27~~ 51, wherein the post-pyrolysis subsystem comprises at least one spray tower comprising an entrance in its lower end and means for creating a downward spray of water droplets, whereby when the mixture

of product gases is introduced into said spray tower through said entrance, said product gases will rise in said tower through said spray of water droplets, thereby dissolving at least one of the components of the mixture of product gases in water.

39. (Previously Presented) A system according to claim 38, wherein the post-pyrolysis subsystem comprises a storage vessel for collecting the solution comprising at least one of the components of the mixture of product gases dissolved in water, and a pump for recycling said solution through the means for creating the downward spray of water droplets in the spray tower until the concentration of said component in said solution reaches a predetermined value.

40. (Currently amended) A system according to claim ~~27~~ 51, wherein the post-pyrolysis subsystem comprises monitoring equipment to measure the composition of the mixture of product gases at selected locations.

41. (Currently amended) A system according to claim ~~27~~ 51, wherein said system has a size and weight that allow said system to be transported from location to location and placed in position at an appropriate place in an existing production line.

42. (Currently amended) A method for using a system according to claim ~~27~~ 51 for neutralizing ~~fluid~~ liquid and gas phase chemical waste products that result from a chemical production process and are collected from the production line, said method comprising:

providing a system according to claim 51 ~~27;~~

activating the plasma ~~torch~~ torch/es to produce a plasma stream having a predetermined temperature;

activating the pre-pyrolysis subsystem to cause said waste to flow through the ~~atomizer~~ atomizer/s thereby creating droplets which effectively contact said plasma ~~stream~~ stream/s whereupon the molecules of said waste dissociate into atoms or ions;

creating predetermined conditions of temperature and concentration of said atoms and ions such that predetermined chemical reactions take place; whereby, following the migration of said atoms or ions from the immediate region of said plasma ~~stream~~ stream/s, a gaseous mixture of recombination products is formed;

activating the post-pyrolysis means to neutralize at least some of said recombination products; and

releasing said recombination products to the surroundings and/or collecting said recombination products.

43. (Presently amended) A method according to claim 42, wherein the ~~fluid~~ liquid or gas phase chemical waste products can be one or more of the types selected from the following group:

liquid;

gas; and

solid heated to its melting point or dissolved in a solvent to form a stable solution.

44. (Presently amended) A method according to claim 42, wherein the system is located in the vicinity of the end of the production line and the ~~fluid~~ liquid or gas phase chemical waste products are neutralized immediately after they exit said production line.

45. (Previously Presented) A method according to claim 42, wherein the ~~fluid~~ liquid chemical waste products are temporarily stored after they exit the production line and then are neutralized.

46. (Previously Presented) A method according to claim 42, wherein a major component of the chemical waste products is comprised of bromine or bromine products.

47. (Previously Presented) A method according to claim 46, wherein the chemical waste products result from the production of tetrabromobisphenol A (TBBA).

48. (Presently Amended) A method according to claim 42, wherein the value of the current flowing between the electrodes of each plasma torch ~~can be~~ is adjusted while the torch is operating.

49. (Previously Presented) A method according to claim 42, wherein the energy requirement of the plasma torch/es is determined from the disassociation energies of the molecules of which the waste is comprised.

50. (Canceled)

51. (New) A system for neutralizing liquid and gas phase chemical waste products that result from a chemical production process and are collected from the production line, said system comprising:

a pyrolysis/reaction chamber having opposed first and second facing side walls and a top wall, and having at least one first opening in the first facing side wall, a plasma torch having electrodes inserted through each said opening in the first facing side wall for creating a plasma in said chamber directed toward said second facing wall, at least one second opening in the second facing side wall oriented toward the plasma torch, and a third opening in the top wall of said chamber;

electrical means for supplying current and voltage to the plasma torch for generating plasma in the chamber;

a pre-pyrolysis subsystem comprising a first inlet to receive liquid and gas phase chemical waste products from a chemical production line; a first inlet conduit connected to said first inlet and to each second opening in said second facing wall; a valve connected to regulate the flow rate in the first inlet conduit, and a variable speed pump to pump chemical waste products from said first inlet through said first inlet conduit to each said second opening in said second facing wall and into said pyrolysis/reaction chamber;

a post-pyrolysis subsystem comprising an exit conduit connected to said third opening in the top wall of said chamber, and means connected to said exit conduit for separating and/or neutralizing various components of gaseous mixture that exits said pyrolysis/reaction chamber through said third opening;

a plurality of sensors for sensing and outputting signals indicative of a plurality of system parameters selected from the group consisting of pressure in an inlet conduit; flow rate in an inlet conduit; current being applied to said plasma torch, voltage of said

plasma torch, inter-electrode distance of a plasma torch, interelectrode distance between a plurality of plasma torches; flow rate of plasma forming gas; temperature of gas stream in said post-pyrolysis subsystem, pressure of gas stream in said post-pyrolysis subsystem, and composition of gas stream in said post-pyrolysis subsystem;

a control unit for storing information and performing computations responsive to signals output by the plurality of sensors to control the system by maintaining a constant flow rate of waste into said pyrolysis/reaction chamber; adjusting the flow rate of plasma forming gas, maintaining a predetermined plasma temperature; and optimizing the operation of said post-pyrolysis system;

a display system for displaying signals indicative of output by said sensors; and

an atomizer attached to the end of each said inlet conduit connected to the second opening of the second facing side wall, said atomizer pointing into said chamber directly opposite said plasma torch for atomizing liquid and gas phase chemical waste being pumped through said inlet conduit as a jet of small droplets directly into plasma being created by the plasma torch, whereby the molecules of the jet of small droplets are instantaneously disassociated by the plasma into their constituent atoms or ions, which rise in the chamber toward the third opening in the top wall while recombining to form a gas phase of stable molecules, which exits the pyrolysis/reaction chamber via the third opening and is processed by the post-pyrolysis subsystem.

52. (New) A system according to claim 51, wherein the post-pyrolysis subsystem is designed in accordance with the predetermined composition of the gases that comprise the mixture of product gases that pass through said exit conduit.